

BELLCOMM, INC.

SUBJECT: Meeting Report - Needs of the Apollo
Program for Lunar Orbiter Support -
Case 340

DATE: January 12, 1967

FROM: C. J. Byrne

MEMORANDUM FOR FILE

I. INTRODUCTION

An action item was generated at the Surveyor/Orbiter Utilization Committee meeting of December 15, 1966, to identify the remaining needs of the Apollo Program for Lunar Orbiter support. To answer this item, a series of meetings were called on December 22, 1966, at MSC by Mr. J. Sevier (MSC/ASPO). A list of the meeting topics and attendees is shown in Attachment A.

II. PRIMARY TARGETS


The primary targets for Lunar Orbiter should be chosen to assure an array of safe landing sites over the area of interest, so that for any month there are three launch opportunities consistent with propulsion, lighting, and launch and recycle constraints. The location of these targets will be chosen by the Lunar Orbiter targeting committee. The Apollo representative on this committee is Mr. J. Dietrich (MSC/SSD).

Propulsion requirements call for sites in the north and south of the landing zone, particularly in the west. Lighting constraints (7° to 20° sun elevation at landing) limit the time a particular site can be used to one day a month. Launch and recycle considerations require sites be chosen to provide launch opportunities no less than 2 days apart and, preferably, 3 days apart.

The attainment of these objectives is, of course, subject to the distribution of safe landing areas on the moon.

III. MSN TRACKING

The accuracy and reliability of the MSN network and trajectory determination software would be improved by tracking Lunar Orbiter spacecraft and comparing the derived trajectories with DSN data. A full exercise of the Apollo tracking system requires active tracking and range-finding as well as doppler tracking by all 85 and 30 foot antennas.



The MSN stations will become operational one by one over a time span from May 1, 1967 to September 1, 1967. Multi-station tracking can be accomplished after September 1, 1967. Therefore, at least one Lunar Orbiter spacecraft should be in lunar orbit and capable of transponding and orienting* from May 1, 1967 to December 31, 1967. Specific tracking periods are to be negotiated with the Lunar Orbiter Project Office.

IV. CREW TRAINING NEEDS

Although vertical photography is preferred for most site survey and support work, oblique views simulating actual viewing conditions are needed for crew training in two tasks:

- (1) Acquiring, tracking, and marking landmarks from lunar orbit, especially those near the landing site, while using the scanning telescope in the CM.
- (2) Acquiring the landing site and redesignating during LM approach in the visibility phase.

The oblique views should be taken under the following conditions, subject to the constraints of Lunar Orbiter:

- (1) Viewing from east to west,
- (2) Elevation angle ** close to 15° ,
- (3) Phase angle of at least 4° ,
- (4) Either the horizon or the terminator should appear in the medium resolution frame, and
- (5) The long direction of the high resolution frame should be oriented east to west.

It is desirable to obtain one oblique view for each Lunar Orbiter target containing, or likely *to contain, high priority safe landing sites.

The oblique photography is of lower priority than the high resolution photography of primary sites and the MSN tests.

*Orientation is required to provide ranging capability through the high gain antenna.

**The point used for determining elevation may be the center of a site, a landmark, or a point near several sites.

V. LANDMARKS

One landmark should be obtained near each landing site and one or two landmarks should be obtained to the east of the landing site. Landmarks must be at least 12° apart and must be within 3° (lunar central angle) from the orbital track. Good locations would be 50° east of the site for a single landmark and 35° and 75° for two additional landmarks.

An examination of high altitude photography from Lunar Orbiter I showed that sufficient vertical photography has been obtained to meet the need for landmarks apart from the sites. The need for landmarks near each site will be met by the oblique and normal photography discussed above.

VI. SCHEDULE

Every attempt should be made to choose targets for and operate Lunar Orbiter C to meet all the needs discussed above. Assuming a successful mission, examination of the data will be required to determine whether all these needs have been met.


C. J. Byrne

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Attachment

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NASA Headquarters

W. C. Beckwith - MTP
P. E. Culbertson - MTL
F. P. Dixon - MTY
E. Z. Gray - MT
E. W. Hall - MTS
T. A. Keegan - MA-2
L. J. Kosofsky - SL
D. R. Lord - MTD
M. J. Raffensperger - MTE
L. Reiffel - MA-6
L. R. Scherer - SL
A. D. Schnyer - MTV
J. H. Turnock - MA-4

Manned Spacecraft Center

J. Dietrich - EF3
J. E. Dornbach - EF3
J. M. Eggleston - EF
T. H. Foss - EF3
O. E. Maynard - PM
J. H. Sasser - EF3
J. R. Sevier - PM3

Langley Research Center

N. L. Crabill - 159
C. A. Nelson - 159
I. G. Recant - 159A
I. Taback - 159
T. A. Young - 159

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G. M. Anderson
D. R. Anselmo
J. O. Cappellari
J. P. Downs
D. R. Hagner
P. L. Havenstein
W. C. Hittinger
B. T. Howard
D. B. James
B. Kaskey
P. R. Knaff
K. E. Martersteck
R. K. McFarland
J. Z. Menard
V. S. Mummert
I. D. Nehama
G. T. Orrok
T. L. Powers
I. M. Ross
R. V. Sperry
T. H. Thompson
J. M. Tschirgi
R. L. Wagner
All Members Division 101
Department 1023
Central File
Library

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ATTACHMENT

Attendance List

All Meetings

J. Sevier - MSC/ASPO
J. Dietrich* - MSC/SSD
D. B. James - Bellcomm
R. L. Wagner "
V. S. Mummert "
C. J. Byrne "
D. D. Lloyd "

Crew Training Aids

J. H. Sasser - MSC/SSD
J. E. Lee - MSC/FCS
A. J. DaSilva - MSC/FCS
C. H. Woodling - MSC/FC
N. Anderson - MSC/FC

MSN Tracking

J. A. Frere - MSC/FSD

Landmarks

R. H. Kidd - MSC/G & CD

*Mr. Dietrich is the MSC representative on the targeting committee for Lunar Orbiter C.